

SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANTS:

Oscar Johannes Maria GODDIJN  
Teunis Cornelis VERWOERD  
Ronny Wilhelmus Hermanus Henrika KRUTWAGEN  
Eline VOOGD

(ii) TITLE OF INVENTION:

ENHANCED ACCUMULATION OF TREHALOSE IN PLANTS

(iii) NUMBER OF SEQUENCES: 27

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: LADAS & PARRY  
(B) STREET: 26 WEST 61 STREET  
(C) CITY: NEW YORK  
(D) STATE: NY  
(E) ZIP: 10023  
(F) COUNTRY: USA

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: 3-1/4" Disk 1.44 MB  
(B) COMPUTER: IBM PC Compatible  
(C) OPERATING SYSTEM: Microsoft Windows for Workgroups 3.11  
(D) SOFTWARE: WordPerfect 6.1 for Windows

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: 08/779,460  
(B) FILING DATE: 07-JAN-1997  
(C) CLASSIFICATION: 435

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER: PY000009/96

21

(B) FILING DATE: 12-JAN-1996

(viii) ATTORNEY/AGENT INFORMATION:

(A) NAME: MASS, Clifford J.

(B) REGISTRATION NO.: 30,086

(C) REF./DOCKET NO.: U-011098-6

(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE NUMBER: (212) 708-1890

(B) TELEAX NUMBER: (212) - 246-8959

(C) TELEX NUMBER: 233288

(2) INFORMATION FOR SEQ ID NO: 1:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 2621 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA to mRNA

(iii) HYPOTHETICAL: NO

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 25..2485
- (D) OTHER INFORMATION: /function= "trehalose phosph.  
synthase and trehalose phosph. phosphatase"  
/product= "bipartite enzyme"

(ix) FEATURE:

- (A) NAME/KEY: unsure
- (B) LOCATION: 1609..1611

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 1:

CTGATCCTGC GGTTTCATCA CAAT ATG ATA CTC TTA CAT CTG ATG CCC CTT		51
Met Ile Leu Leu His Leu Met Pro Leu		
1	5	
CAG ATG CTC CCA AAT AGG TTG ATT GTC GTA TCG AAT CAG TTA CCC ATA		99
Gln Met Leu Pro Asn Arg Leu Ile Val Val Ser Asn Gln Leu Pro Ile		
10	15	20
25		
ATC GCT AGG CTA AGA CTA ACG ACA ATG GAG GGT CCT TTT GGG ATT TCA		147
Ile Ala Arg Leu Arg Leu Thr Thr Met Glu Gly Pro Phe Gly Ile Ser		
30	35	40
CTT GGG ACG AGA GTT CGA TTT ACA TGC ACA TCA AAG ATG CAT TAC CCG		195
Leu Gly Thr Arg Val Arg Phe Thr Cys Thr Ser Lys Met His Tyr Pro		
45	50	55
CAG CCG TTG AGG TTT TCT ATT CTT GGC GAT CCA CTA AGG GCT GAC GTT		243
Gln Pro Leu Arg Phe Ser Ile Leu Gly Asp Pro Leu Arg Ala Asp Val		
60	65	70
GGC CCT ACC GAA CAA GAT GAC GTG TCA AAG ACA TTG CTC GAT AGG TTT		291
Gly Pro Thr Glu Gln Asp Asp Val Ser Lys Thr Leu Leu Asp Arg Phe		
75	80	85
AAT TGC GTT GCG GTT TTT GTC CCT ACT TCA AAA TGG GAC CAA TAT TAT		339
Asn Cys Val Ala Val Phe Val Pro Thr Ser Lys Trp Asp Gln Tyr Tyr		
90	95	100
105		
CAC TGC TTT TGT AAG CAG TAT TTG TGG CCG ATA TTT CAT TAC AAG GTT		387
His Cys Phe Cys Lys Gln Tyr Leu Trp Pro Ile Phe His Tyr Lys Val		
110	115	120
CCC GCT TCT GAC GTC AAG AGT GTC CCG AAT AGT CGG GAT TCA TGG AAC		435
Pro Ala Ser Asp Val Lys Ser Val Pro Asn Ser Arg Asp Ser Trp Asn		
125	130	135
GCT TAT GTT CAC GTG AAC AAA GAG TTT TCC CAG AAG GTG ATG GAG GCA		483
Ala Tyr Val His Val Asn Lys Glu Phe Ser Gln Lys Val Met Glu Ala		
140	145	150
GTA ACC AAT CGT AGC AAT TAT GTA TGG ATA CAT GAC TAC CAT TTA ATG		531
Val Thr Asn Arg Ser Asn Tyr Val Trp Ile His Asp Tyr His Leu Met		
155	160	165
ACG CTA CCG ACT TTC TTG AGG CGG GAT TTT TGT CGT TTT AAA ATC GGT		579
Thr Leu Pro Thr Phe Leu Arg Arg Asp Phe Cys Arg Phe Lys Ile Gly		
170	175	180
185		
TTT TTT CTG CAT AGC CCG TTT CCT TCC TCG GAG GTT TAC AAG ACC CTA		627
Phe Phe Leu His Ser Pro Phe Pro Ser Ser Glu Val Tyr Lys Thr Leu		
190	195	200

CCA ATG AGA AAC GAG CTC TTG AAG GGT CTG TTA AAT GCT GAT CTT ATC 675  
Pro Met Arg Asn Glu Leu Leu Lys Gly Leu Leu Asn Ala Asp Leu Ile  
205 210 215

GGG TTC CAT ACA TAC GAT TAT GCC CGT CAT TTT CTA ACG TGT TGT AGT 723  
Gly Phe His Thr Tyr Asp Tyr Ala Arg His Phe Leu Thr Cys Cys Ser  
220 225 230

CGA ATG TTT GGT TTG GAT CAT CAG TTG AAA AGG GGG TAC ATT TTC TTG 771  
Arg Met Phe Gly Leu Asp His Gln Leu Lys Arg Gly Tyr Ile Phe Leu  
235 240 245

GAA TAT AAT GGA AGG AGC ATT GAG ATC AAG ATA AAG GCG AGC GGG ATT 819  
Glu Tyr Asn Gly Arg Ser Ile Glu Ile Lys Ile Lys Ala Ser Gly Ile  
250 255 260 265

CAT GTT GGT CGA ATG GAG TCG TAC TTG AGT CAG CCC GAT ACA AGA TTA 867  
His Val Gly Arg Met Glu Ser Tyr Leu Ser Gln Pro Asp Thr Arg Leu  
270 275 280

CAA GTT CAA GAA GTC CAA AAA CGT TCG AAG GAA ATC GTG CTA CTG GGA 915  
Gln Val Gln Glu Val Gln Lys Arg Ser Lys Glu Ile Val Leu Leu Gly  
285 290 295

GTT GAT GAT TTG GAT ATA TTC AAA GGT GTG AAC TTC AAG GTT TTA GCG 963  
Val Asp Asp Leu Asp Ile Phe Lys Gly Val Asn Phe Lys Val Leu Ala  
300 305 310

TTG GAG AAG TTA CTT AAA TCA CAC CCG AGT TGG CAA GGG CGT GTG GAA 1011  
Leu Glu Lys Leu Leu Lys Ser His Pro Ser Trp Gln Gly Arg Val Glu  
315 320 325

AAG GTG CAA ATC TTG AAT CCT CTG CGC CGT TGC CAA GAC GTC GAT GAG 1059  
Lys Val Gln Ile Leu Asn Pro Leu Arg Arg Cys Gln Asp Val Asp Glu  
330 335 340 345

ATC AAT GCC GAG ATA AGA ACA GTC TGT GAA AGA ATC AAT AAC GAA CTG 1107  
Ile Asn Ala Glu Ile Arg Thr Val Cys Glu Arg Ile Asn Asn Glu Leu  
350 355 360

GGA AGC CCG GGA TAC CAG CCC GTT GTG TTA ATT GAT GGG CCC GTT TCG 1155  
Gly Ser Pro Gly Tyr Gln Pro Val Val Leu Ile Asp Gly Pro Val Ser  
365 370 375

TTA AGT GAA AAA GCT TAT TAT GCT ATC GCC GAT ATG GCA ATT GTT 1203  
Leu Ser Glu Lys Ala Ala Tyr Tyr Ala Ile Ala Asp Met Ala Ile Val  
380 385 390

ACA CCG TTA CGT GAC GGA CTG AAT CTT ATC CCG TAC GAG TAC GTC GTT 1251  
Thr Pro Leu Arg Asp Gly Leu Asn Leu Ile Pro Tyr Glu Tyr Val Val  
395 400 405

2000-09-05 12:22:30

TCC CGA CAA AGT GTT AAT GAC CCA AAT CCC AAT ACT CCA AAA AAG AGC Ser Arg Gln Ser Val Asn Asp Pro Asn Pro Asn Thr Pro Lys Lys Ser 410	415	420	425	1299
ATG CTA GTG GTC TCC GAG TTC ATC GGT GTT TCA CTA TCT TTA ACC GGG Met Leu Val Val Ser Glu Phe Ile Gly Val Ser Leu Ser Leu Thr Gly 430	435		440	1347
GCC ATA CGG GTC AAC CCA TGG GAT GAG TTG GAG ACA GCA GAA GCA TTA Ala Ile Arg Val Asn Pro Trp Asp Glu Leu Glu Thr Ala Glu Ala Leu 445	450		455	1395
TAC GAC GCA CTC ATG GCT CCT GAT GAC CAT AAA GAA ACC GCC CAC ATG Tyr Asp Ala Leu Met Ala Pro Asp Asp His Lys Glu Thr Ala His Met 460	465		470	1443
AAA CAG TAT CAA TAC ATT ATC TCC CAT GAT GTA GCT AAC TGG GCT AGC Lys Gln Tyr Gln Tyr Ile Ile Ser His Asp Val Ala Asn Trp Ala Ser 475	480		485	1491
TTC TTT CAA GAT TTA GAG CAA GCG TGC ATC GAT CAT TCT CGT AAA CGA Phe Phe Gln Asp Leu Glu Gln Ala Cys Ile Asp His Ser Arg Lys Arg 490	495	500		1539
TGC ATG AAT TTA GGA TTT GGG TTA GAT ACT AGA GTC GTC TTT TTG ATG Cys Met Asn Leu Gly Phe Gly Leu Asp Thr Arg Val Val Phe Leu Met 510	515		520	1587
AGA AGT TTA GCA AGT TGG ATA AAG ATG TCT TGG AAG AAT GCT TAT TCC Arg Ser Leu Ala Ser Trp Ile Lys Met Ser Trp Lys Asn Ala Tyr Ser 525	530		535	1635
ATG GCT CAA AAT CGG GCC ATA CTT TTG GAC TAT GAC GGC ACT GTT ACT Met Ala Gln Asn Arg Ala Ile Leu Leu Asp Tyr Asp Gly Thr Val Thr 540	545		550	1683
CCA TCT ATC AGT AAA TCT CCA ACT GAA GCT GTT ATC TCC ATG ATC AAC Pro Ser Ile Ser Lys Ser Pro Thr Glu Ala Val Ile Ser Met Ile Asn 555	560		565	1731
AAA CTG TGC AAT GAT CCA AAG AAC ATG GTG TTC ATC GTT AGT GGA CGC Lys Leu Cys Asn Asp Pro Lys Asn Met Val Phe Ile Val Ser Gly Arg 570	575	580		1779
AGT AGA GAG AAA ATC TTG GCA GTT GGT TCG GCG CGT GTG AGA ACC CGC Ser Arg Glu Lys Ile Leu Ala Val Gly Ser Ala Arg Val Arg Thr Arg 590	595		600	1827
CAT TGC ACT GAG CAC GGA TAC TTT ATA AGG TGG GCG GGT GAT CAA GAA His Cys Thr Glu His Gly Tyr Phe Ile Arg Trp Ala Gly Asp Gln Glu 605	610		615	1875

TGG GAA ACG TGC GCA CGT GAG AAT AAT GTC GGG TGG ATG GAT GGA AAT Trp Glu Thr Cys Ala Arg Glu Asn Asn Val Gly Trp Met Asp Gly Asn 620 625 630	1923
CTG AGG CCG GTT ATG AAT CTT TAT ACA GAA ACT ACT GAC GGT TCG TAT Leu Arg Pro Val Met Asn Leu Tyr Thr Glu Thr Thr Asp Gly Ser Tyr 635 640 645	1971
ATT GAA AAG AAA GAA ACT GCA ATG GTT TGG CAC TAT GAA GAT GCT GAT Ile Glu Lys Lys Glu Thr Ala Met Val Trp His Tyr Glu Asp Ala Asp 650 655 660 665	2019
AAA GAT CTT GGG TTG GAG CAG GCT AAG GAA CTG TTG GAC CAT CTT GAA Lys Asp Leu Gly Leu Glu Gln Ala Lys Glu Leu Leu Asp His Leu Glu 670 675 680	2067
AAC GTG CTC GCT AAT GAG CCC GTT GGA GTG AAT CGA ACA GGT CAA TAC Asn Val Leu Ala Asn Glu Pro Val Gly Val Asn Arg Thr Gly Gln Tyr 685 690 695	2115
ATT GTA GAA GTT AAA CCA CAG TCC CCC ATT AAT TAC CTT CTT GTT ATG Ile Val Glu Val Lys Pro Gln Ser Pro Ile Asn Tyr Leu Leu Val Met 700 705 710	2163
ACA TTC ATA GGC ACT GAT TGT AGA ATC TTT AAC TTA AAT TTC TTT AAA Thr Phe Ile Gly Thr Asp Cys Arg Ile Phe Asn Leu Asn Phe Phe Lys 715 720 725	2211
TAT GAA TGC AAT TAT AGG GGG TCA CTA AAA GGT ATA GTT GCA GAG AAG Tyr Glu Cys Asn Tyr Arg Gly Ser Leu Lys Gly Ile Val Ala Glu Lys 730 735 740 745	2259
ATT TTT GCG TTC ATG GCT AAA AAG GGA AAA CAG GCT GAT TTC GTG TTG Ile Phe Ala Phe Met Ala Lys Lys Gly Lys Gln Ala Asp Phe Val Leu 750 755 760	2307
ACG TTG AAT GAT AGA AGT GAT GAA GAC ATG TTT GTG GCC ATT GGG GAT Thr Leu Asn Asp Arg Ser Asp Glu Asp Met Phe Val Ala Ile Gly Asp 765 770 775	2355
GGA ATA AAA AAG GGT CGG ATA ACT AAC AAC AAT TCA GTG TTT ACA TGC Gly Ile Lys Lys Gly Arg Ile Thr Asn Asn Asn Ser Val Phe Thr Cys 780 785 790	2403
GTA GTG GGA GAG AAA CCG AGT GCA GCT GAG TAC TTT TTA AAT GAT GTC Val Val Gly Glu Lys Pro Ser Ala Ala Glu Tyr Phe Leu Asn Asp Val 795 800 805	2451
TCG AGA AGC TCC GGG TGT CTC AGC AAC CAA GGA T GATCCGGAAAG Ser Arg Ser Ser Gly Cys Leu Ser Asn Gln Gly 810 815 820	2495
CTTCTCGTGA TCTTTATGAG TTAAAAGTTT TCGACTTTTT CTTCATCAAG ATTCAATGGGA	2555

AAGTTGTTCA ATATGAACCTT GTGTTCTTGG TTCTGGATTT TAGGGAGTCT ATGGATATAA

2615

: CATTTC

2621

(2) INFORMATION FOR SEQ ID NO: 2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 820 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 2:

Met Ile Leu Leu His Leu Met Pro Leu Gln Met Leu Pro Asn Arg Leu  
1 5 10 15

Ile Val Val Ser Asn Gln Leu Pro Ile Ile Ala Arg Leu Arg Leu Thr  
20 25 30

Thr Met Glu Gly Pro Phe Gly Ile Ser Leu Gly Thr Arg Val Arg Phe  
35 40 45

Thr Cys Thr Ser Lys Met His Tyr Pro Gln Pro Leu Arg Phe Ser Ile  
50 55 60

Leu Gly Asp Pro Leu Arg Ala Asp Val Gly Pro Thr Glu Gln Asp Asp  
65 70 75 80

Val Ser Lys Thr Leu Leu Asp Arg Phe Asn Cys Val Ala Val Phe Val  
85 90 95

Pro Thr Ser Lys Trp Asp Gln Tyr Tyr His Cys Phe Cys Lys Gln Tyr  
100 105 110

Leu Trp Pro Ile Phe His Tyr Lys Val Pro Ala Ser Asp Val Lys Ser  
115 120 125

Val Pro Asn Ser Arg Asp Ser Trp Asn Ala Tyr Val His Val Asn Lys  
130 135 140

Glu Phe Ser Gln Lys Val Met Glu Ala Val Thr Asn Arg Ser Asn Tyr  
145 150 155 160

Val Trp Ile His Asp Tyr His Leu Met Thr Leu Pro Thr Phe Leu Arg  
165 170 175

Arg Asp Phe Cys Arg Phe Lys Ile Gly Phe Phe Leu His Ser Pro Phe  
180 185 190

Pro Ser Ser Glu Val Tyr Lys Thr Leu Pro Met Arg Asn Glu Leu Leu  
195 200 205

Lys Gly Leu Leu Asn Ala Asp Leu Ile Gly Phe His Thr Tyr Asp Tyr  
 210 215 220  
 Ala Arg His Phe Leu Thr Cys Cys Ser Arg Met Phe Gly Leu Asp His  
 225 230 235 240  
 Gln Leu Lys Arg Gly Tyr Ile Phe Leu Glu Tyr Asn Gly Arg Ser Ile  
 245 250 255  
 Glu Ile Lys Ile Lys Ala Ser Gly Ile His Val Gly Arg Met Glu Ser  
 260 265 270  
 Tyr Leu Ser Gln Pro Asp Thr Arg Leu Gln Val Gln Glu Val Gln Lys  
 275 280 285  
 Arg Ser Lys Glu Ile Val Leu Leu Gly Val Asp Asp Leu Asp Ile Phe  
 290 295 300  
 Lys Gly Val Asn Phe Lys Val Leu Ala Leu Glu Lys Leu Leu Lys Ser  
 305 310 315 320  
 His Pro Ser Trp Gln Gly Arg Val Glu Lys Val Gln Ile Leu Asn Pro  
 325 330 335  
 Leu Arg Arg Cys Gln Asp Val Asp Glu Ile Asn Ala Glu Ile Arg Thr  
 340 345 350  
 Val Cys Glu Arg Ile Asn Asn Glu Leu Gly Ser Pro Gly Tyr Gln Pro  
 355 360 365  
 Val Val Leu Ile Asp Gly Pro Val Ser Leu Ser Glu Lys Ala Ala Tyr  
 370 375 380  
 Tyr Ala Ile Ala Asp Met Ala Ile Val Thr Pro Leu Arg Asp Gly Leu  
 385 390 395 400  
 Asn Leu Ile Pro Tyr Glu Tyr Val Val Ser Arg Gln Ser Val Asn Asp  
 405 410 415  
 Pro Asn Pro Asn Thr Pro Lys Lys Ser Met Leu Val Val Ser Glu Phe  
 420 425 430  
 Ile Gly Val Ser Leu Ser Leu Thr Gly Ala Ile Arg Val Asn Pro Trp  
 435 440 445  
 Asp Glu Leu Glu Thr Ala Glu Ala Leu Tyr Asp Ala Leu Met Ala Pro  
 450 455 460  
 Asp Asp His Lys Glu Thr Ala His Met Lys Gln Tyr Gln Tyr Ile Ile  
 465 470 475 480  
 Ser His Asp Val Ala Asn Trp Ala Ser Phe Phe Gln Asp Leu Glu Gln  
 485 490 495

Ala Cys Ile Asp His Ser Arg Lys Arg Cys Met Asn Leu Gly Phe Gly  
500 505 510

Leu Asp Thr Arg Val Val Phe Leu Met Arg Ser Leu Ala Ser Trp Ile  
515 520 525

Lys Met Ser Trp Lys Asn Ala Tyr Ser Met Ala Gln Asn Arg Ala Ile  
530 535 540

Leu Leu Asp Tyr Asp Gly Thr Val Thr Pro Ser Ile Ser Lys Ser Pro  
545 550 555 560

Thr Glu Ala Val Ile Ser Met Ile Asn Lys Leu Cys Asn Asp Pro Lys  
565 570 575

Asn Met Val Phe Ile Val Ser Gly Arg Ser Arg Glu Lys Ile Leu Ala  
580 585 590

Val Gly Ser Ala Arg Val Arg Thr Arg His Cys Thr Glu His Gly Tyr  
595 600 605

Phe Ile Arg Trp Ala Gly Asp Gln Glu Trp Glu Thr Cys Ala Arg Glu  
610 615 620

Asn Asn Val Gly Trp Met Asp Gly Asn Leu Arg Pro Val Met Asn Leu  
625 630 635 640

Tyr Thr Glu Thr Thr Asp Gly Ser Tyr Ile Glu Lys Lys Glu Thr Ala  
645 650 655

Met Val Trp His Tyr Glu Asp Ala Asp Lys Asp Leu Gly Leu Glu Gln  
660 665 670

Ala Lys Glu Leu Leu Asp His Leu Glu Asn Val Leu Ala Asn Glu Pro  
675 680 685

Val Gly Val Asn Arg Thr Gly Gln Tyr Ile Val Glu Val Lys Pro Gln  
690 695 700

Ser Pro Ile Asn Tyr Leu Leu Val Met Thr Phe Ile Gly Thr Asp Cys  
705 710 715 720

Arg Ile Phe Asn Leu Asn Phe Phe Lys Tyr Glu Cys Asn Tyr Arg Gly  
725 730 735

Ser Leu Lys Gly Ile Val Ala Glu Lys Ile Phe Ala Phe Met Ala Lys  
740 745 750

Lys Gly Lys Gln Ala Asp Phe Val Leu Thr Leu Asn Asp Arg Ser Asp  
755 760 765

Glu Asp Met Phe Val Ala Ile Gly Asp Gly Ile Lys Lys Gly Arg Ile  
770 775 780

Thr Asn Asn Asn Ser Val Phe Thr Cys Val Val Gly Glu Lys Pro Ser  
785 790 795 800

Ala Ala Glu Tyr Phe Leu Asn Asp Val Ser Arg Ser Ser Gly Cys Leu  
805 810 815

Ser Asn Gln Gly  
820

(2) INFORMATION FOR SEQ ID NO: 3:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 25 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(iii) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 3:

AAGCTTATGT TGCCATATAG AGTAG

25

(2) INFORMATION FOR SEQ ID NO: 4:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 24 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(iii) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 4:

GTAGTTGCCA TGGTGCAAAT GTTC

24

38

(2) INFORMATION FOR SEQ ID NO: 5:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 20 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 5:

AGCTCTGCAG TGAGGTACCA

20

(2) INFORMATION FOR SEQ ID NO: 6:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 20 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 6:

GACGTCACTC CATGGTTCGA

20

(2) INFORMATION FOR SEQ ID NO: 7:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 24 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 7:

GTACCCTGCA GTGTGACCCT AGAC

24

## (2) INFORMATION FOR SEQ ID NO: 8:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 21 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 8:

TCGATTCTATA GAAGCTTACA T

21

## (2) INFORMATION FOR SEQ ID NO: 9:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 2207 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: double
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA to mRNA

(iii) HYPOTHETICAL: NO

(iii) ANTI-SENSE: NO

- (vi) ORIGINAL SOURCE:
- (A) ORGANISM: Solanum tuberosum
  - (B) STRAIN: Kardal

- (ix) FEATURE:
- (A) NAME/KEY: CDS
  - (B) LOCATION: 161..1906

- (ix) FEATURE:
- (A) NAME/KEY: misc\_feature
  - (B) LOCATION: 842..850
  - (D) OTHER INFORMATION: /function= "putative glycosylation site"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 9:

CTTTTCTGAG TAATAACATA GGCATTGATT TTTTTCAAT TAATAACACC TGAAACATT

60

CCCATTGCCG GCATTCTCTG TTCTTACAAA AAAAAACATT TTTTGTTCA CATAAAATTAG

120

TTATGGCATC AGTATTGAAC CCTTTAACTT GTTATACAAT ATG GGT AAA GCT ATA Met Gly Lys Ala Ile 1 5	175
ATT TTT ATG ATT TTT ACT ATG TCT ATG AAT ATG ATT AAA GCT GAA ACT Ile Phe Met Ile Phe Thr Met Ser Met Asn Met Ile Lys Ala Glu Thr 10 15 20	223
TGC AAA TCC ATT GAT AAG GGT CCT GTA ATC CCA ACA ACC CCT TTA GTG Cys Lys Ser Ile Asp Lys Gly Pro Val Ile Pro Thr Thr Pro Leu Val 25 30 35	271
ATT TTT CTT GAA AAA GTT CAA GAA GCT GCT CTT CAA ACT TAT GGC CAT Ile Phe Leu Glu Lys Val Gln Glu Ala Ala Leu Gln Thr Tyr Gly His 40 45 50	319
AAA GGG TTT GAT GCT AAA CTG TTT GAT ATG TCA CTG AGA GAG AGT Lys Gly Phe Asp Ala Lys Leu Phe Val Asp Met Ser Leu Arg Glu Ser 55 60 65	367
CTT TCA GAA ACA GTT GAA GCT TTT AAT AAG CTT CCA AGA GTT GTG AAT Leu Ser Glu Thr Val Glu Ala Phe Asn Lys Leu Pro Arg Val Val Asn 70 75 80 85	415
GGT TCA ATA TCA AAA AGT GAT TTG GAT GGT TTT ATA GGT AGT TAC TTG Gly Ser Ile Ser Lys Ser Asp Leu Asp Gly Phe Ile Gly Ser Tyr Leu 90 95 100	463
AGT AGT CCT GAT AAG GAT TTG GTT TAT GTT GAG CCT ATG GAT TTT GTG Ser Ser Pro Asp Lys Asp Leu Val Tyr Val Glu Pro Met Asp Phe Val 105 110 115	511
GCT GAG CCT GAA GGC TTT TTG CCA AAG GTG AAG AAT TCT GAG GTG AGG Ala Glu Pro Glu Gly Phe Leu Pro Lys Val Lys Asn Ser Glu Val Arg 120 125 130	559
GCA TGG GCA TTG GAG GTG CAT TCA CTT TGG AAG AAT TTA AGT AGG AAA Ala Trp Ala Leu Glu Val His Ser Leu Trp Lys Asn Leu Ser Arg Lys 135 140 145	607
GTG GCT GAT CAT GTA TTG GAA AAA CCA GAG TTG TAT ACT TTG CTT CCA Val Ala Asp His Val Leu Glu Lys Pro Glu Leu Tyr Thr Leu Leu Pro 150 155 160 165	655
TTG AAA AAT CCA GTT ATT ATA CCG GGA TCG CGT TTT AAG GAG GTT TAT Leu Lys Asn Pro Val Ile Ile Pro Gly Ser Arg Phe Lys Glu Val Tyr 170 175 180	703
TAT TGG GAT TCT TAT TGG GTA ATA AGG GGT TTG TTA GCA AGC AAA ATG Tyr Trp Asp Ser Tyr Trp Val Ile Arg Gly Leu Leu Ala Ser Lys Met 185 190 195	751

TAT GAA ACT GCA AAA GGG ATT GTG ACT AAT CTG GTT TCT CTG ATA GAT Tyr Glu Thr Ala Lys Gly Ile Val Thr Asn Leu Val Ser Leu Ile Asp	799
200 205 210	
CAA TTT GGT TAT GTT CTT AAC GGT GCA AGA GCA TAC TAC AGT AAC AGA Gln Phe Gly Tyr Val Leu Asn Gly Ala Arg Ala Tyr Tyr Ser Asn Arg	847
215 220 225	
AGT CAG CCT CCT GTC CTG GCC ACG ATG ATT GTT GAC ATA TTC AAT CAG Ser Gln Pro Pro Val Leu Ala Thr Met Ile Val Asp Ile Phe Asn Gln	895
230 235 240 245	
ACA GGT GAT TTA AAT TTG GTT AGA AGA TCC CTT CCT GCT TTG CTC AAG Thr Gly Asp Leu Asn Leu Val Arg Arg Ser Leu Pro Ala Leu Lys	943
250 255 260	
GAG AAT CAT TTT TGG AAT TCA GGA ATA CAT AAG GTG ACT ATT CAA GAT Glu Asn His Phe Trp Asn Ser Gly Ile His Lys Val Thr Ile Gln Asp	991
265 270 275	
GCT CAG GGA TCA AAC CAC AGC TTG AGT CGG TAC TAT GCT ATG TGG AAT Ala Gln Gly Ser Asn His Ser Leu Ser Arg Tyr Tyr Ala Met Trp Asn	1039
280 285 290	
AAG CCC CGT CCA GAA TCG TCA ACT ATA GAC AGT GAA ACA GCT TCC GTA Lys Pro Arg Pro Glu Ser Ser Thr Ile Asp Ser Glu Thr Ala Ser Val	1087
295 300 305	
CTC CCA AAT ATA TGT GAA AAA AGA GAA TTA TAC CGT GAA CTG GCA TCA Leu Pro Asn Ile Cys Glu Lys Arg Glu Leu Tyr Arg Glu Leu Ala Ser	1135
310 315 320 325	
GCT GCT GAA AGT GGA TGG GAT TTC AGT TCA AGA TGG ATG AGC AAC GGA Ala Ala Glu Ser Gly Trp Asp Phe Ser Ser Arg Trp Met Ser Asn Gly	1183
330 335 340	
TCT GAT CTG ACA ACA ACT AGT ACA ACA TCA ATT CTA CCA GTT GAT TTG Ser Asp Leu Thr Thr Ser Thr Ser Ile Leu Pro Val Asp Leu	1231
345 350 355	
AAT GCA TTC CTT CTG AAG ATG GAA CTT GAC ATT GCC TTT CTA GCA AAT Asn Ala Phe Leu Leu Lys Met Glu Leu Asp Ile Ala Phe Leu Ala Asn	1279
360 365 370	
CTT GTT GGA GAA AGT AGC ACG GCT TCA CAT TTT ACA GAA GCT GCT CAA Leu Val Gly Glu Ser Ser Thr Ala Ser His Phe Thr Glu Ala Ala Gln	1327
375 380 385	
AAT AGA CAG AAG GCT ATA AAC TGT ATC TTT TGG AAC GCA GAG ATG GGG Asn Arg Gln Lys Ala Ile Asn Cys Ile Phe Trp Asn Ala Glu Met Gly	1375
390 395 400 405	



## (2) INFORMATION FOR SEQ ID NO: 10:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 581 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

## (ii) MOLECULE TYPE: protein

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 10:

Met Gly Lys Ala Ile Ile Phe Met Ile Phe Thr Met Ser Met Asn Met  
1 5 10 15

Ile Lys Ala Glu Thr Cys Lys Ser Ile Asp Lys Gly Pro Val Ile Pro  
20 25 30

Thr Thr Pro Leu Val Ile Phe Leu Glu Lys Val Gln Glu Ala Ala Leu  
35 40 45

Gln Thr Tyr Gly His Lys Gly Phe Asp Ala Lys Leu Phe Val Asp Met  
50 55 60

Ser Leu Arg Glu Ser Leu Ser Glu Thr Val Glu Ala Phe Asn Lys Leu  
65 70 75 80

Pro Arg Val Val Asn Gly Ser Ile Ser Lys Ser Asp Leu Asp Gly Phe  
85 90 95

Ile Gly Ser Tyr Leu Ser Ser Pro Asp Lys Asp Leu Val Tyr Val Glu  
100 105 110

Pro Met Asp Phe Val Ala Glu Pro Glu Gly Phe Leu Pro Lys Val Lys  
115 120 125

Asn Ser Glu Val Arg Ala Trp Ala Leu Glu Val His Ser Leu Trp Lys  
130 135 140

Asn Leu Ser Arg Lys Val Ala Asp His Val Leu Glu Lys Pro Glu Leu  
145 150 155 160

Tyr Thr Leu Leu Pro Leu Lys Asn Pro Val Ile Ile Pro Gly Ser Arg  
165 170 175

Phe Lys Glu Val Tyr Tyr Trp Asp Ser Tyr Trp Val Ile Arg Gly Leu  
180 185 190

Leu Ala Ser Lys Met Tyr Glu Thr Ala Lys Gly Ile Val Thr Asn Leu  
195 200 205

Val Ser Leu Ile Asp Gln Phe Gly Tyr Val Leu Asn Gly Ala Arg Ala  
210 215 220

Tyr Tyr Ser Asn Arg Ser Gln Pro Pro Val Leu Ala Thr Met Ile Val  
225 230 235 240

Asp Ile Phe Asn Gln Thr Gly Asp Leu Asn Leu Val Arg Arg Ser Leu  
245 250 255

Pro Ala Leu Leu Lys Glu Asn His Phe Trp Asn Ser Gly Ile His Lys  
260 265 270

Val Thr Ile Gln Asp Ala Gln Gly Ser Asn His Ser Leu Ser Arg Tyr  
275 280 285

Tyr Ala Met Trp Asn Lys Pro Arg Pro Glu Ser Ser Thr Ile Asp Ser  
290 295 300

Glu Thr Ala Ser Val Leu Pro Asn Ile Cys Glu Lys Arg Glu Leu Tyr  
305 310 315 320

Arg Glu Leu Ala Ser Ala Ala Glu Ser Gly Trp Asp Phe Ser Ser Arg  
325 330 335

Trp Met Ser Asn Gly Ser Asp Leu Thr Thr Thr Ser Thr Ser Ile  
340 345 350

Leu Pro Val Asp Leu Asn Ala Phe Leu Leu Lys Met Glu Leu Asp Ile  
355 360 365

Ala Phe Leu Ala Asn Leu Val Gly Glu Ser Ser Thr Ala Ser His Phe  
370 375 380

Thr Glu Ala Ala Gln Asn Arg Gln Lys Ala Ile Asn Cys Ile Phe Trp  
385 390 395 400

Asn Ala Glu Met Gly Gln Trp Leu Asp Tyr Trp Leu Thr Asn Ser Asp  
405 410 415

Thr Ser Glu Asp Ile Tyr Lys Trp Glu Asp Leu His Gln Asn Lys Lys  
420 425 430

Ser Phe Ala Ser Asn Phe Val Pro Leu Trp Thr Glu Ile Ser Cys Ser  
435 440 445

Asp Asn Asn Ile Thr Thr Gln Lys Val Val Gln Ser Leu Met Ser Ser  
450 455 460

Gly Leu Leu Gln Pro Ala Gly Ile Ala Met Thr Leu Ser Asn Thr Gly  
465 470 475 480

Gln Gln Trp Asp Phe Pro Asn Gly Trp Pro Pro Leu Gln His Ile Ile  
485 490 495

Ile Glu Gly Leu Leu Arg Ser Gly Leu Glu Glu Ala Arg Thr Leu Ala  
500 505 510

Lys Asp Ile Ala Ile Arg Trp Leu Arg Thr Asn Tyr Val Thr Tyr Lys  
515 520 525

Lys Thr Gly Ala Met Tyr Glu Lys Tyr Asp Val Thr Lys Cys Gly Ala  
530 535 540

Tyr Gly Gly Gly Glu Tyr Met Ser Gln Thr Gly Phe Gly Trp Ser  
545 550 555 560

Asn Gly Val Val Leu Ala Leu Leu Glu Glu Phe Gly Trp Pro Glu Asp  
565 570 575

Leu Lys Ile Asp Cys  
580

(2) INFORMATION FOR SEQ ID NO: 11:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 33 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 6
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 15
- (D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 11:

GGYGGNMGMT TYRWNGARKT MTAYKRYTGG GAC

33

(2) INFORMATION FOR SEQ ID NO: 12:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 26 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 3
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 6
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 9
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 12
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 15
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 21
- (D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 12:

GTNCCNGGNG GNCGNTTYRW NGARKT

26

(2) INFORMATION FOR SEQ ID NO: 13:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 26 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(ix) FEATURE:

- (A) NAME/KEY: modified\_base  
(B) LOCATION: 3  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base  
(B) LOCATION: 9  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base  
(B) LOCATION: 12  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base  
(B) LOCATION: 15  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base  
(B) LOCATION: 18  
(D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 13:

GGNNGGYTGNS WNCGNYRNAG RTARTA

26

(2) INFORMATION FOR SEQ ID NO: 14:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 24 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: YES

(ix) FEATURE:

- (A) NAME/KEY: modified\_base  
(B) LOCATION: 1  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base  
(B) LOCATION: 7  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 19
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 22
- (D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 14:

NSCRTTNRYC CATCCRAANC CNTC

24

(2) INFORMATION FOR SEQ ID NO: 15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 15:

CGAACGGGC CCATCAATT

20

(2) INFORMATION FOR SEQ ID NO: 16:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 16:

TCGATGAGAT CAATGCCGAG

20

## (2) INFORMATION FOR SEQ ID NO: 17:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 27 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 17:

CCATCCTAAT ACGACTCACT ATAGGGC

27

## (2) INFORMATION FOR SEQ ID NO: 18:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 20 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 18:

CACAACAGGC TGGTATCCCG

20

## (2) INFORMATION FOR SEQ ID NO: 19:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 20 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 19:

CAATAACGAA CTGGGAAGCC

20

(2) INFORMATION FOR SEQ ID NO: 20:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 23 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 20:

ACTCACTATA GGGCTCGAGC GGC

23

(2) INFORMATION FOR SEQ ID NO: 21:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 26 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 4
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 6
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 9
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 15
- (D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 21:

GAYNTNATNT GGRTNCAYGA YTAYCA

26

(2) INFORMATION FOR SEQ ID NO: 22:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 3
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 6
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 12
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 18
- (D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 22:

CCNACNGTRC ANGCRAANAC

20

(2) INFORMATION FOR SEQ ID NO: 23:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 28 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

- (ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 2  
(D) OTHER INFORMATION: /mod\_base= i
- (ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 5  
(D) OTHER INFORMATION: /mod\_base= i
- (ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 8  
(D) OTHER INFORMATION: /mod\_base= i
- (ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 14  
(D) OTHER INFORMATION: /mod\_base= i
- (ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 20  
(D) OTHER INFORMATION: /mod\_base= i
- (ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 23  
(D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 23:

TNCGNTKNTT YYTNCAYAYN CCNTTYCC

28

(2) INFORMATION FOR SEQ ID NO: 24:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

- (ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 6  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 9  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 18  
(D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 24:

TGRTCNARNA RYTCYTTNGC

20

(2) INFORMATION FOR SEQ ID NO: 25:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 9  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 12  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 15  
(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:  
(A) NAME/KEY: modified\_base  
(B) LOCATION: 18  
(D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 25:

CCRTGYTCNG CNSWNARNCC

20

54

(2) INFORMATION FOR SEQ ID NO: 26:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 20 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 6
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 17
- (D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 26:

TCRTCNNGTRA ARTCRTCNCC

20

(2) INFORMATION FOR SEQ ID NO: 27:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 22 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 3
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 6
- (D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 15

(D) OTHER INFORMATION: /mod\_base= i

(ix) FEATURE:

- (A) NAME/KEY: modified\_base
- (B) LOCATION: 21
- (D) OTHER INFORMATION: /mod\_base= i

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 27:

GYNACNARRT TCATNCCRTC NC

22